

## What is Claimed is:

- [c1] A micromachined filter system, comprising:
- a micro-device having a plurality of micromachined layers formed over a substrate; and
  - a micromachined filter integrated in at least one of the micromachined layers.
- [c2] The system of claim 1, wherein the at least one of the micromachined layers is a micromachined polysilicon layer.
- [c3] The system of claim 1, wherein the micro-device comprises a plurality of micromachined layers, and wherein the micromachined filter is integrated in at least two of the plurality of micromachined layers.
- [c4] The system of claim 3, wherein the micromachined filter comprises:
- a first grid of intersecting beams and a first plurality of holes separating the beams formed in a first micromachined layer; and
  - a second grid of intersecting beams and a second plurality of holes separating the beams formed in a second micromachined layer that is adjacent the first micromachined layer, the first and second grids being at least partially offset so that first and second pluralities of holes are at least partially offset.
- [c5] The system of claim 1, wherein the micromachined filter comprises a grid of intersecting beams and a plurality of holes separating the beams.
- [c6] The system of claim 5, wherein each of the holes has a width of about 1 nanometer to about 500 microns.
- [c7] The system of claim 5, wherein each of the holes has a width of about 1 micron to about 500 microns.
- [c8] The system of claim 5, wherein each of the beams has a width of at least about 1 micron.
- [c9] The system of claim 1, wherein the micro-device has a fluid inlet through the substrate and the micromachined filter is situated downstream of the fluid inlet.

- [c10] The system of claim 9, wherein the micromachined filter is situated over the fluid inlet.
- [c11] A micromachined filter system, comprising:  
a micro-device having a plurality of micromachined layers formed over a substrate and a fluid inlet; and  
a micromachined filter integrated in the micro-device downstream of the fluid inlet.
- [c12] The system of claim 11, wherein the micromachined filter comprises a series of substantially parallel beams.
- [c13] The system of claim 11, wherein the micromachined filter comprises a series of substantially parallel columns.
- [c14] The system of claim 11, wherein the micromachined filter comprises:  
a first series of substantially parallel beams; and  
a second series of substantially parallel beams, the first and second series of beams being substantially parallel and at least partially offset to one another.
- [c15] The system of claim 11, wherein the micromachined filter comprises:  
a first series of substantially parallel beams; and  
a second series of substantially parallel beams, the first and second series of beams being non-parallel to one another.
- [c16] The system of claim 11, wherein the micromachined filter comprises a grid of intersecting beams and a plurality of holes separating the beams.
- [c17] The system of claim 11, wherein the micromachined filter comprises:  
a first grid of intersecting beams and a first plurality of holes separating the beams formed in a first layer; and  
a second grid of intersecting beams and a second plurality of holes separating the beams formed in a second layer that is adjacent the first layer, the first and second grids being at least partially offset so that first and second pluralities of holes are at least partially offset.
- [c18] A filter comprising a micromachined layer of polysilicon.

- [c19] The filter of claim 18, wherein the micromachined layer of polysilicon comprises a series of substantially parallel beams.
- [c20] The filter of claim 18, wherein the micromachined layer of polysilicon comprises a series of substantially parallel columns.
- [c21] The filter of claim 18, wherein the micromachined layer of polysilicon comprises:  
a first series of substantially parallel beams; and  
a second series of substantially parallel beams, the first and second series of beams being substantially parallel and at least partially offset to one another.
- [c22] The filter of claim 18, wherein the micromachined layer of polysilicon comprises:  
a first series of substantially parallel beams; and  
a second series of substantially parallel beams, the first and second series of beams being non-parallel to one another.
- [c23] The filter of claim 18, wherein the micromachined layer of polysilicon comprises a grid of intersecting beams and a plurality of holes separating the beams.
- [c24] The filter of claim 18, wherein the micromachined layer of polysilicon comprises:  
a first grid of intersecting beams and a first plurality of holes separating the beams formed in a first layer; and  
a second grid of intersecting beams and a second plurality of holes separating the beams formed in a second layer that is adjacent the first layer, the first and second grids being at least partially offset so that first and second pluralities of holes are at least partially offset.
- [c25] A method of filtering a fluid flowing into a micro-device, comprising:  
passing a fluid through a fluid inlet of a micro-device; and  
passing the fluid through a filter that is integrated in the micro-device downstream of the fluid inlet.
- [c26] The method of claim 25, further comprising passing the fluid through a pre-filter that is upstream of the fluid inlet.
- [c27] The method of claim 25, wherein passing the fluid through the integrated filter

comprises filtering particulates as small as about 10 microns.

[c28] The method of claim 25, wherein passing the fluid through the integrated filter comprises filtering particulates as small as about 2 microns.

[c29] The method of claim 23, wherein passing the fluid through the integrated filter comprises filtering particulates as small as about 0.1 microns.

[c30] A method of manufacturing a micro-device having an integrated filter, comprising:  
forming a substrate;  
forming a layer of sacrificial material over the substrate;  
patterning the layer of sacrificial material;  
forming a layer of structural material over the layer of sacrificial material;  
and  
removing the layer of sacrificial material.

[c31] The method of claim 30, further comprising patterning the layer of structural material to form a plurality of holes through the layer of structural material prior to removing the layer of sacrificial material.

[c32] The method of claim 30, further comprising forming a subsequent layer of sacrificial material over the substrate;  
patterning the subsequent layer of sacrificial material;  
forming a subsequent layer of structural material over the subsequent layer of sacrificial material, prior to removing the layers of sacrificial material.